

What is claimed is:

1. A magnetic resonance imaging system for interventional MRI involving an operation to insert a device into an object, comprising:

5 detection means for detecting a position of a tip of the device; and

movement state display means for displaying a movement state of the tip of the device on the basis of data indicative of the position of the tip detected by the detection means.

10 2. The magnetic resonance imaging system according to claim 1, wherein the movement state display means includes production means for producing movement locus data indicative of the device from the data indicative of the position of the tip detected by the producing means; and display means for displaying the movement locus data produced by the production means.

15 3. The magnetic resonance imaging system according to claim 2, wherein the production means includes means for marking the data indicative of the position of the tip at every appropriate time instant, and means for grouping the data existing between the marked time instants at every marking, the grouped data being outputted as the movement locus data, 20 wherein the display means is composed of means for displaying the grouped data in different modes group by group.

25 4. The magnetic resonance imaging system according to claim 3, wherein the production means includes operation means, arranged at an operating handle portion of the device, for generating a signal for the marking.

5. The magnetic resonance imaging system according to claim 3, wherein the display means is composed of means for displaying the grouped data in different degrees of intensity or different kinds of color.

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6. The magnetic resonance imaging system according to claim 5, wherein the display means is composed of means for displaying the grouped data in different degrees of intensity or different kinds of color depending on a period of time elapsing after each grouping.

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7. The magnetic resonance imaging system according to claim 2, wherein the display means is composed of means for displaying the movement locus data produced by the production means on a reference image in a superimposition manner.

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8. The magnetic resonance imaging system according to claim 1, wherein the movement state display means is composed of means for displaying the data indicative of the position of the tip detected by the detection means, together with information indicative of a sequence of time in detecting the data.

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9. The magnetic resonance imaging system according to claim 8, wherein the information indicative of the sequence of time is one of intensity degrees for displaying the data of the position, different hues for displaying the data of the position, and thinning degrees of data for displaying the data of the position.

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10. The magnetic resonance imaging system according to claim 1, wherein the movement state display means for

displaying the data of the position of the tip detected by the detection means on a reference image in a superimposition manner.

5 11. The magnetic resonance imaging system according to claim 1, wherein the detection means has a minute RF detection coil attached on the tip of the device, means for acquiring, together with application of a magnetic gradient, an MR signal from a vicinity of the RF detection coil excited by an RF
10 magnetic field, and means for obtaining a position of the RF detection coil as the position of the tip through a frequency analysis of the MR signal.

15 12. The magnetic resonance imaging system according to claim 11, wherein the RF detection coil is one in number and attached on the tip of the device.

20 13. The magnetic resonance imaging system according to claim 1, wherein the device is a catheter.

25 14. A magnetic resonance imaging system for interventional MRI involving an operation to insert a device into an object, in which an image of a section of the object being obtained from an MR signal using an MR signal acquired through application of a magnetic field based on a given pulse sequence to the object, comprising:

position detecting means for detecting positional information of the device; and

30 control means for controlling imaging parameters included in the pulse sequence on the basis of the positional information detected by the position detecting means so that the section always contain the device.

15. The magnetic resonance imaging system according to claim 14, wherein the position detecting means includes a sensor consisting of one of a minute RF detection coil, a magnetism detecting member, and a marker member outputting an MR signal.

16. The magnetic resonance imaging system according to claim 15, wherein the sensor is composed of at least two sensors attached to a main body of the device.

17. The magnetic resonance imaging system according to claim 15, wherein the sensor is composed of at least two sensors attached to one of a support portion of the device and a grip portion of the device.

18. A magnetic resonance imaging system for interventional MRI involving operations to insert a device into an object, in which an image of a section of the object being obtained from an MR signal based on an MR signal acquired through application of a magnetic field based on a given pulse sequence to the object, comprising:

preoperative plan means for planning information in relation to the operations of the device based on the image prior to the operations; and

output means for outputting the information in relation to the operations planned by the preoperative plan means in association with the object.

19. The magnetic resonance imaging system according to claim 18, wherein the preoperative plan means is composed of means for planning as the information a target's position, an

insertion start position on a object body, and a path connecting the target's position and the insertion start position, all of which is necessary when the device is inserted into the body.

5 20. The magnetic resonance imaging system according to claim 19, wherein the output means is composed of means for indicating at least the insertion start position of the device onto the object body.

10 21. The magnetic resonance imaging system according to claim 20, wherein the outputting means includes a light projector for projecting light showing at least the insertion start position of the device onto the object body.

15 22. The magnetic resonance imaging system according to claim 18, wherein the device is a puncture needle and the plan is a plan for needling the puncture needle.

20 23. A method of preparing for interventional MRI involving operations of a device to be inserted into an object, the method comprising the steps of:

acquiring an image of a section of the object through MR imaging with the object laid on a couch;

25 planning, before the operations, information in relation to the operations of the device based on the image while the object is laid on the couch; and

outputting the planned information in association with the object.

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